UNITED STATES PATENT AND TRADEMARK OFFICE

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10/735,714	12/16/2003	Venkatesan Shanmugam	60497.000016	3454

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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after t he mailing date of this com munication, even if timely filed, may re duce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _Amendment filed on May 9, 2007_.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-20_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-20_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Response to Remarks

1.   The Office Action has been issued in response to amendment filed May 9, 2007.

Claims 1-20 are pending. Applicant's arguments have been carefully and respectfully

considered in light of the instant amendment, and are persuasive. However, upon

review of the prior art, a new ground of rejection is presented.

Response to Specification Objection

A new title was presented. Therefore the objection has been removed.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

3.   Claims 1-7 and 9-17 and 19-20 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Townsend (US Patent No.: 6,490,476) in view of Newport et al (Pub

No.: 2003/0161521) further in view of Hamill et al (Pub No.: US 2003/0190065).

As to claim independent claim 1, Townsend discloses a method for executing a

scanning procedure (column 1, lines 15-25) comprising the steps of: (a) generating CT

image data for a scan (column 13, lines 5-7); (b) generating CT attenuation correction

data for the scan (column 13, lines 24-25); (c) acquiring a current frame of PET data for the scan in a 3D format (column 13, lines 7-9); and (d) simultaneously conducting the following steps: reconstructing at least a portion of a PET image for the current frame, including the step of overlapping a portion of the current frame with an adjacent frame, and acquiring at least a portion of a next frame of PET data (note that the PET images are acquired over a 20 minute period, see [0080], lines 4-5).

Townsend teaches reconstructing the PET image, however does not specifically teaches reconstructing at least a portion of a PET image for the current frame, including the step of overlapping a portion of the current frame with an adjacent frame.

Newport discloses a method for 3D reconstructing from PET wherein at least a portion of a PET image for the current frame and acquiring at least a portion of a next frame of PET data (see [p][0015] and [p][0016], where a parallel architecture is used to acquired and reconstruct PET images; also note that the images are being process while they are being acquired; therefore, both processes are performed simultaneously, see abstract). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have substituted the image reconstruction method of Townsend with the reconstruction method of Newport for positron emission (PET) reconstruction and acquisition using a parallel pipeline architecture ([p][0015], lines 1-4) so that the image data can processed or operated on at the same time ([p][0017], lines 12-15) thus reducing the reconstruction time for the PET data.

Note the discussion above, neither Townsend or Newport teach wherein the PET reconstruction step includes overlapping a portion of the current frame with an adjacent

adjacent frame. Hamill discloses a medical image reconstruction method ([p][0004],
lines 1-3) that includes the step of overlapping a portion of the current frame with an
adjacent frame (see [p][0080], lines 1-19, where PET images are acquired with a 30 cm
overlap between two bed positions).

At the time of the invention, it would have been obvious to a person of ordinary
skill in the art to have substituted the image reconstruction method of Townsend as
modified by with the medical image reconstruction method of Hamill to acquired 3D
PET tomography of a subject, correct the 3D emission sinograms for scatter and
attenuation and applied Fourier recombining for reconstruction a 3D PET tomography of
the subject ([p][0080], lines 1-19) which is of good quality in a short period of time
([p][0041], lines 16-18).

As to claim independent claim 11, this claim differs from claim 1 only in that claim
11 is system whereas, claim 1 is method and the limitations memory and processor are
additively recited. Townsend discloses a system comprising: a CT detector (12, see Fig
2a); a PET detector (14, see Fig 2a); however does not expressly disclose the system
comprising: at least one memory; and at least one processor. Hamill discloses a
system (see Fig 1) comprising: at least one memory (e.g. 14 A, see Fig 1); and at least
one processor (e.g. 12, see Fig 1). Thus combining the teachings of Townsend and
Hamill would meet the claim limitations for the same reasons as discussed with respect
to claim 1 above.

As to claim 2, note the discussion above, Hamill teaches the method, further comprising repeating step (d) for at least one subsequent frame (note that the PET images are acquired over a 20 minute period, see [0080], lines 4-5).

As to claim 3, Townsend teaches the method, wherein the 3D format comprises a projection plane format (column 15, lines 19-22).

As to claim 4, Townsend teaches the method of claim 3, wherein the step of reconstructing at least a portion of a PET image comprises applying a Fourier rebinning (column 13, lines 29-34) process to directly convert the PET data from the projection plane format to a sinogram format (column 13, lines 45-56).

As to claim 5, note the discussion above, Hamill teaches the method wherein the step of overlapping comprises computing a weight for each overlapping slice in the overlapping portion of the current frame and the adjacent frame (see [p][0046] and [p][0047], where a projection weight is determined).

As to claim 6, note the discussion above, Hamill teaches the method, wherein the adjacent frame comprises a previous frame, and the step of overlapping comprises retrieving a stored overlapping portion of the previous frame ([p][0080], lines 13-18).

As to claim 7, note the discussion above, Hamill teaches the method, further

comprising the step of storing an overlapping portion of the current frame to enable

overlapping during reconstruction of the next frame (see [p][0044], lines 11-14, where

input and output data is stored in memory).

As to claim 9, Townsend teaches the method, further comprising the step of

generating a fused PET-CT image (e.g. see Fig 10 C) with the CT image data and the

PET image.

As to claim 10, Townsend teaches the method, wherein the reconstructing step

includes applying an attenuation correction to the PET image using the CT attenuation

correction data (column 13, lines 29-31).

Claims 12-20 are differ from claims 2-10 only in that claims 12-20 are a method

claim whereas, claims 12-20 are system claims. Thus, claims 12-20 are analyzed as

previously discussed with respect to claim 2-10 above.

4.   Claims 8 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Townsend (US Patent No.: 6,490,476) in view of Hamill et al (Pub No.: US

2003/0190065) further

5.   Claims 8 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Townsend (US Patent No.: 6,490,476) in view of Newport et al (Pub No.:

2003/0161521) further in view of Hamill et al (Pub No.: US 2003/0190065) further in

view of Koritzinsky et al (US Patent No.: 6,272,469).

As to claim 8, Neither Townsend , Newport or Hamill disclose the method,

further comprising the step of automatically configuring a scan protocol for the PET data

based on a scan protocol used to acquire the image CT data. Koritzinsky discloses a

method for executing protocol (column 1, lines 5-7) that includes the step of

automatically configuring a scan protocol for the PET data based on a scan protocol

used to acquire the image CT data (see column 2, lines 59-61, where the protocol is

automatically selected).

At the time of the invention, it would have been obvious to a person of ordinary

skill in the art to have added the method for executing protocol of Koritzinsky to the

combined PET and X-Ray CT tomography method of Townsend as modified by Hamill

and Newport to automatically select a protocol for linking several scanners in a

radiology department of a medial institution (column 2, lines 45-62).

Claim 18 is differ from claims 8 only in that claim 8 is a method claim whereas,

claim 18 is system claim. Thus, claim 8 is analyzed as previously discussed with

respect to claim 18 above.

Inquires

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Andrae S. Allison whose telephone number is (571)

270-1052. The examiner can normally be reached on Monday-Friday, 8:00 am - 5:00 +-pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on (571) 272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andrae Allison

July 16, 2007

SAMIR AHMED
PRIMARY EXAMINER